MISSOURI NOSOCOMIAL INFECTION REPORTING DATA

Report to the Governor and General Assembly
2007

Missouri Department of Health and Senior Services
AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER

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Executive Summary

Background

In 2004, the Missouri legislature passed Senate Bill 1279, establishing the "Missouri Nosocomial Infection Reporting Act of 2004." The law requires hospitals and ambulatory surgical centers (ASCs) to report specific categories of healthcare-associated infections (HAIs) to the Department of Health and Senior Services (DHSS). This report summarizes 2006 data on central line-associated bloodstream (CLAB) infections and surgical site infections (SSIs).

Data Collection

The infections selected for hospital reporting include ventilator-associated pneumonia (VAP), CLAB infections, and SSIs. Hospitals are reporting SSIs related to procedures for abdominal hysterectomy, hip repair and coronary artery bypass surgery. ASCs report SSIs associated with hernia repair and breast surgery procedures. Hospital intensive care units (ICUs) have been reporting CLAB infections to the department since July 2005. Collection of SSI data began in January 2006. Due to the variation among hospitals in the way VAP is diagnosed, hospitals are now collecting data on head-of-bed (HOB) elevation in lieu of VAP. Elevating the head lowers the risk for contracting a VAP.

Reporting to the Public

The DHSS has developed an interactive public website to convey information on the collected data. CLAB infection rates for July 2005-March 2006 were published last year. Rates for SSIs and CLAB infections for 2006 were published on the website in November 2007. As each new quarter of SSI and CLAB data become available, the earliest quarter will be deleted and the latest quarter will be added to form the most current 12 months of data for viewing. HOB data will be published after sufficient data are collected.

Data Summary

One hundred-seven ICUs from 72 hospitals reported CLAB infection data. Infection rates were lowest in the coronary ICU (2.0/1000 central-line days) and highest in the pediatric ICU (5.2/1000). Only the neonatal ICU rate (3.0/1000) was lower than the U.S. rate (4.6/1000) recently published by the Centers for Disease Control and Prevention (CDC). Compared to the data for July 2005-March 2006, CLAB infection rates for 2006 appear to be slightly lower for the medical/surgical, surgical and pediatric ICUs.

Sixty-nine hospitals and 26 ASCs collected SSI data. After adjusting for severity of procedure, the lowest SSI rate for hospitals was for hip repair (1.3/100 surgeries), while the highest was for coronary artery bypass surgery (3.1/100). All three rates were lower than those published for earlier years by the CDC. The ASCs had infection rates lower than 1/100 surgeries. This may be due in large part to infections not being detected by the ASCs, since patients do not stay overnight as they are likely to in hospitals. ASCs also perform procedures that have a lower risk of infection.

Cautions
HAI rates are affected by each facility's level of resources and commitment to infection control, as well as the care with which they collect and report their data. Also, a facility that treats severely ill patients may find it more difficult to prevent HAIs. A consumer who is trying to select a facility for healthcare should consider the experience of the staff, the advice of their physician, and all the other factors that are unique to his or her situation, in addition to the infection data reported on the DHSS website.

Next Steps
Adding HOB data to the department's website will enhance the consumer's ability to make good choices about their healthcare. An amendment to the reporting law is needed to mandate reporting of important process measures such as HOB elevation.

Missouri Nosocomial Infection Reporting Data: Report to the Governor and General Assembly for 2007

Background

Healthcare-associated infections (HAIs), also known as nosocomial infections, are infections that occur while patients are in a healthcare setting. Because of the seriousness of their conditions, patients treated in intensive care units (ICUs) have an especially high risk of HAIs. HAIs can severely aggravate an illness and lengthen hospital stays. HAIs continue to be a major public health problem in the United States. "The Guidance on Public Reporting of Healthcare-Associated Infections…" published by the Healthcare Infection Control Practices Advisory Committee in 2005[1], states that in hospitals alone, HAIs account for an estimated 2 million infections, 90,000 deaths and $4.5 billion dollars in excess healthcare costs annually.

In 2004, the Missouri legislature passed Senate Bill 1279, establishing the "Missouri Nosocomial Infection Reporting Act of 2004." The intent of the law is to establish conditions that will lead to a decrease in HAIs in Missouri. Among other stipulations, the law requires hospitals and ambulatory surgical centers (ASCs) to report specific categories of HAIs to the Department of Health and Senior Services (DHSS).

The law also requires the DHSS to submit an annual report to the governor and members of the general assembly and to publish the report on the department's Internet website. Rather than including copies of every table from the website (www.dhss.mo.gov/HAI), this report summarizes the data and presents and explains representative tables.

Data Collection

Procedures and HAIs are reported to the DHSS according to 19 CSR 10-33.050, which became effective July 30, 2005. The reporting rule was promulgated under the authority of the revised statute that mandates data reporting by hospitals and ASCs (Section 192.667, RSMo.). The data that are collected follow the recommendations of the infection control advisory panel. This panel includes a statistician, a microbiologist and representatives of consumers, physicians, infection control professionals and regulators.

Reporting differs for hospitals and ASCs. The infections initially selected for monitoring by hospitals include ventilator-associated pneumonia (VAP), central line-associated bloodstream (CLAB) infections, and surgical site infections (SSIs). The SSIs selected are those associated with procedures for abdominal hysterectomy, hip repair and coronary artery bypass surgery. ASCs must report SSIs associated with procedures for hernia repair and breast surgery. To provide denominators for the infection rates, facilities must report every one of the selected procedures regardless of whether the procedure resulted in an infection. Because patients in intensive care units are particularly at risk for HAIs, hospital reporting of CLAB infections is done for one or more of six specific intensive care units (ICUs): medical, surgical, medical/surgical, coronary, neonatal and pediatric. The SSIs are reported by facility rather than ICU.

To ensure that the data being collected are reliable, the DHSS established reporting requirements for the facilities. In establishing the requirements for hospitals, Missouri followed the lead of the Centers for Disease Control and Prevention (CDC). For CLAB infections, only hospitals that had at least 50 central line-days in the prior year must report during the current year. For SSIs, hospitals and ASCs must report if they performed at least 20 of the specified surgeries in the prior year. Reporting is done through the Missouri Healthcare-Associated Infection Reporting System (MHIRS), a web-based system developed by DHSS staff and the Information Technology Support Division of the Office of Administration. MHIRS allows facilities to enter HAI data directly into a DHSS database each month.

Registration for reporting by hospitals and ASCs occurs annually in March-April. Facilities report the number of central line-days per ICU and the number of reportable surgeries during the preceding calendar year. Using this information, the DHSS determines which facilities will be required to report infection data for each of the specified ICUs and surgeries.

Hospitals have been reporting CLAB infections to the department since July 2005, and the first nine months of these data were published on the department's website in December 2006. Recording of SSI data by hospitals and ASCs began in January 2006. The entire 2006 data were published on the website in November 2007. The 2006 SSI and CLAB infection data are the primary subject of this report.

Reporting of VAP has been postponed. Because the diagnosis involves clinical judgment, hospitals do not use a standard method of diagnosing VAP**.** Both the infection control advisory panel and an expert panel convened to study the issue recommended that a process measure, elevation of the head of the bed (HOB), be reported instead. The risk of contracting a VAP is substantially reduced for patients on ventilators if they have their heads elevated at least 30 degrees. This measure has been included in a group of VAP measures endorsed by the Joint Commission on Accreditation of Healthcare Organizations.

Public Reporting

Figure 1 of this report depicts the main page of the public reporting site. This page introduces users to the site and presents a brief overview of HAIs. A number of useful links are displayed: 'Healthcare-Associated Infections' provides expanded information on HAIs; 'Instructions for Using this Site' helps the user interpret the selection page and data tables; 'Definition of Terms' is a list of technical terms and their definitions; 'Frequently Asked Questions' presents background information in an easy-to-read format; 'Laws, Regulations and Manuals' links the user to Section 192.667, RSMo. and related chapters and regulations, and allows the user to view the manuals and forms used by the facilities to report their data; 'Related Links' connects the user to other sites that have information on HAIs.

In Figure 2 the main selection page is shown. Users can choose to compare hospitals or ASCs to selected comparison groups, or to view a facility profile (all the HAI data available for the facility). If a user wants to view comparison data, they can choose to view CLAB infection or SSI data. For CLAB infections, they choose a specific type of ICU and region of the state. For SSIs, they choose a facility type (hospital or ASC), a surgery type and then a region of the state. Passing the computer mouse over a region produces a list of the reporting facilities. A link at the

bottom of the page explains that facilities do not appear on the list if they had too few central line-days or surgeries to meet the reporting requirements.

Table 1 shows an example of the 'Hospital Comparison' table. It displays results for SSIs related to coronary artery bypass procedures. The symbols (◒,○,●) indicate whether the SSI rate was similar to, higher than, or lower than that of a comparison group. For hospitals, the comparison groups can include similar size facilities, all reporting facilities, or facilities nationally that report to CDC. As shown in Table 1, Boone Hospital Center had lower coronary artery bypass-related infection rates when compared to each of the three comparison groups. Rates for most of the other hospitals were not significantly different from the comparison group rates.

Risk groups are used to adjust the comparisons in the 'Hospital Comparison' table to make them fairer. This is because some facilities may do more procedures that put patients at risk for an infection. The risk factors that are used to adjust the comparisons are 1) the degree of contamination of the wound at the time of the operation, 2) the duration of the procedure, and 3) the American Society of Anesthesiologist's physical status classification system.

When 'Data' is selected from a 'Hospital Comparison' table, infection rates are shown according to the risk factor group. This can be seen in Table 2 for Boone Hospital Center. It reported 340 coronary artery bypass procedures and three infections in risk group 1, and 46 procedures and one infection in risk group 2. These represent rates of .9 and 2.2 infections per 100 procedures, respectively.

Users can also select 'Comments' on this table. This will display any comments the facility had on their data. Facilities view their data prior to publication to check for accuracy and to provide any comments that might help the public understand their data.

Instead of choosing to compare facilities, users can select a particular facility to profile. This allows them to view all of the HAI data for the facility in one place. As Table 3 shows, Boone Hospital Center reported CLAB infection data for three ICUs and SSI data for all three of the reportable surgeries. It had lower rates than at least one comparison group for each of the three ICUs and for two of the three surgeries.

Data Summary

Central Line-Associated Bloodstream (CLAB) Infections

A total of 107 ICUs from 72 hospitals reported CLAB infection data during 2006. Six hospital ICUs had rates that were significantly higher than the state or national rate. Nine ICUs had rates that were significantly lower than the state or national rate.

Data for all reporting hospital ICUs are summarized in Table 4. The average number of infections was lowest for coronary ICUs, where it was 3.3 infections per hospital. The highest average was for pediatric ICUs, where it was 9.6 per hospital. The statewide infection rates followed the same pattern—2.0/1000 central-line days for coronary ICUs and 5.2/1000 for pediatric ICUs. Compared to the national rates reported by the CDC for 2006,[2] only the neonatal ICU rate (3.0/1000) was significantly lower than the rate reported by CDC (4.6/1000). (The CDC

rates represent hospitals that voluntarily submitted data to the CDC's nosocomial infection surveillance system; rates from a representative national sample might be different.)

In Table 5, the 2006 CLAB infection data are displayed alongside the first-published CLAB infection data (July 2005-March 2006). The rates were not tested for significant differences because the reporting periods overlap--2006 data for January-March are in both sets of data--and the data for July 2005-March 2006 are for only nine months. Nevertheless, table 5 suggests that compared to the earlier data, the 2006 infection rates are somewhat lower for the medical/surgical, surgical and pediatric ICUs. The rates for the coronary, medical and neonatal ICUs are fairly similar for the two reporting periods.

Surgical Site Infections (SSIs)
Hospitals
Sixty-nine hospitals out of the 130 acute care hospitals in Missouri reported SSI data. Fifty-seven hospitals had at least 20 hip repair and 20 abdominal hysterectomy surgeries, and 33 hospitals had at least 20 coronary artery bypass surgeries. Four hospitals had infection rates that were significantly lower than the state or U.S. rate, or the rate for hospitals of the same size. Six hospitals had rates that were significantly higher than one of these comparison groups.

Summary data for the hospitals are presented in Table 6. The average number of infections was lowest for hip repair--1.8 infections per hospital, and highest for coronary artery bypass surgery--6.8 infections per hospital. The statewide infection rate, adjusted for level of risk, showed the same pattern, ranging from 1.3/100 surgeries for hip repair, to 3.1/100 for coronary artery bypass surgery. All three statewide rates, after adjusting for severity of surgery, were significantly lower than the U.S. infection rates reported by the CDC in 2004[3].

Ambulatory Surgery Centers (ASCs)
Twenty-six ASCs out of roughly 90 reported SSI data. Twenty ASCs had at least 20 hernia repair surgeries and 16 ASCs had at least 20 breast surgeries. Table 7 shows that the average SSI rate per ASC and the statewide rate per 100 surgeries were less than 1 for both types of surgeries. This is probably related to the fact that a patient will not discover an infection until after he or she has left the ASC. The patient is then likely to seek care from an emergency room or doctor, and the ASC may never become aware of the infection. The breast and hernia repair surgeries done by ASCs also tend to have lower risks of infection than the three procedures reported by the hospitals.

Cautions
The infection rates reported by the DHSS are affected by each facility's level of resources and commitment to infection control, as well as the care with which they collect and report their data. Beyond checking for obvious errors, the DHSS is not able to verify the numbers that the facilities submit each month, and it is likely that some facilities do a better job of reporting than others. On the other hand, it is to each facility's advantage to accurately diagnose and monitor all infections. We believe most, if not all facilities, are guided by this philosophy.

A further consideration is that hospitals and ASCs vary in the types of patients they treat. A facility that treats severely ill patients will be at higher risk for HAIs. In order to mitigate this

effect, CLAB infection data are reported separately for each type of ICU, and the SSI comparisons are adjusted for the severity level of the surgery. While these adjustments help to make the data between facilities more comparable, users of the data should understand that these adjustments are not perfect. A consumer who is choosing a facility for healthcare should also consider the experience of the staff, the advice of their physician, and all other factors that are unique to his or her situation.

Next Steps

As noted earlier, the DHSS was advised by both its infection control advisory panel and an expert panel to collect head-of-bed (HOB) elevation data in place of incidence data for VAP. Fifty-nine hospitals reported at least 100 ventilator-days during 2006, and all but two agreed to voluntarily[4] submit HOB data to the DHSS. These data are now being collected by the hospitals and will be published on the DHSS website in the future.

Footnotes

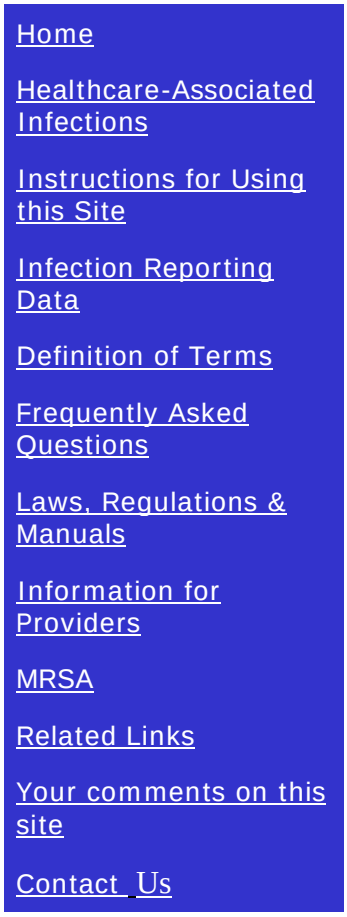
1. Guidance on public reporting of healthcare-associated infections: recommendations of the Healthcare Infection Control Practices Advisory Committee. McKibben et al., Am J Infect Control. 3(4):217-26.

2. National rates for CLABs for 2006 (National Healthcare Safety Network (NHSN) Report, data summary for 2006, issued June 2007) became available after the 2006 Missouri data were published on the DHSS website, but before this report was written; therefore the results of the comparisons to the U.S. rates presented in this report differ somewhat from the comparisons published on the website.

3. National rates published by CDC were available for 2006 for CLABs but not for SSIs. Data from the 2004 publication (National Nosocomial Infections Surveillance (NNIS) System Report, data summary from January 1992 through June 2004, issued October 2004) were used to compare SSI rates for Missouri and the U.S., both on the website and in this report.

4. Hospitals currently are not required by statute or regulation to submit data related to head of bed (HOB) elevation. It is anticipated that the next legislative session (2008) will address an amendment to the statute to allow for mandatory reporting of process measures such as HOB elevation.

Figure 1: Missouri Healthcare-Associated Infection Reporting



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Healthcare- Associated Infections, also known as nosocomial infections, continue to be a major health problem in the United States. HAIs can be very serious, increasing the cost and length of your hospital stay and even threatening your life.

In Missouri, hospitals and ambulatory surgery centers (ASCs) are required by **state law and regulation** to report selected HAI data. The reported infection data are available, by facility, on this web site. Currently, data are reported for central line-associated bloodstream (CLAB) infections and surgical site infections (SSIs). In the near future, information on head of bead elevation (HOB) will be added. HOB is a process measure related to ventilator associated pneumonia.

As a consumer, you should be proactive in your healthcare. The information on this site can help you to:

- Understand more about HAIs - what they are and why they occur.
- Be informed about hospital and ASC infection rates in Missouri.
- Learn what you, as a patient, can do to lower your risk of a HAI.

Keep in mind that a facility's experience with HAIs is only one thing to consider when choosing a facility. The advice of your physician, the experience of the facilities and surgeons, and other factors unique to your situation should be considered as well.

Please review the **Instructions for Using this Site**, Definition of terms and other information listed on the left bar of this page to help you understand the data tables displayed on this site. If you have been to this site previously, you may want to go directly to the **Infection Reporting Data**.

Figure 2: Main Selection Page

For information on hospitals or ambulatory surgery centers (ASCs), follow the instructions below:

Step One: Select information type.

- ◉ Comparison data for multiple hospitals or ASCs
- ○ Profile for individual hospital or ASC

Step Two: Select a reporting category.

- ○ Central Line-Associated Bloodstream (CLAB) Infection - Hospitals only
- ◉ Surgical Site Infection (SSI) - Hospitals or ASCs
- ○ Ventilator-Associated Pneumonia (VAP) - Hospitals only **Note: Data not yet available**

Step Three

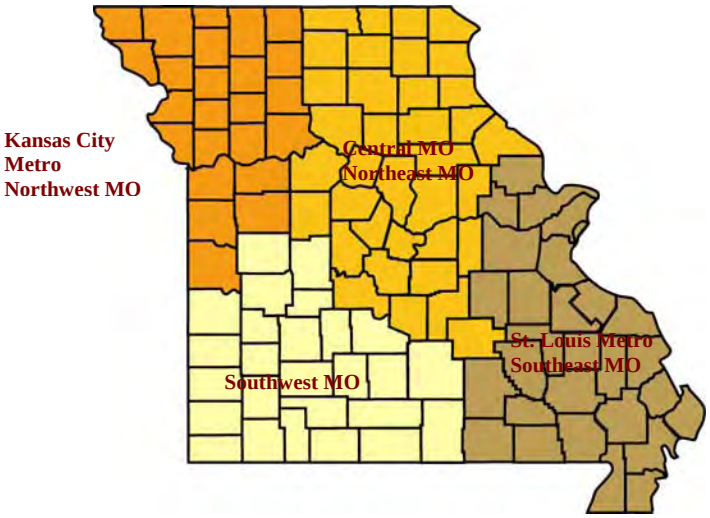
- ◉ Hospital
- ○ ASC

Step Four

Select Surgery Type: Surgical

Step Five

To view a list of reporting facilities, place mouse over a region below.
To view performance of hospitals, click on a region.



Saint Luke's Hospital of Kansas City
Truman Medical Center – Hospital Hill

Note: If your Hospital/ASC does not appear in any region, Click here.

Table 1: Healthcare-Associated Infection Reporting

Surgical Site Infection (SSI)
Hospital Comparison

Procedure: Coronary Artery Bypass Graft
Region: Central MO - Northeast MO
Reporting Period: 01/01/2006 - 12/31/2006
Main Page

Facility Name	Hospital Performance Compared with Similar Size Facilities in Missouri	Hospital Performance Compared with All Missouri Facilities	Hospital Performance Compared with Facilities in U.S.	Hospital Specific Information
⊞ Boone Hospital Center	●	●	●	Data Comments
⊞ Capital Region Medical Center	◒	◒	◒	Data Comments
⊞ Lake Regional Health System	○	○	◒	Data Comments
⊞ St. Mary's Health Center - Jefferson City	◒	◒	◒	Data Comments
⊞ University of MO Hospital & Clinics	◒	◒	◒	Data Comments

●= Infection rate lower than other hospitals in the comparison group

◒= Infection rate similar to other hospitals in the comparison group

○= Infection rate higher than other hospitals in the comparison group.

N/A = Too few hospitals in the comparison group for reliable rate calculation

Note: The above comparisons are based on **significance tests**.

⊞ = Click on this symbol to expand or close information on the facility.

Table 2: Healthcare-Associated Infection Reporting

Surgical Site Infection (SSI)
Hospital Infection Rates

Facility Name: Boone Hospital Center
Procedure: Coronary Artery Bypass Graft
Region: Central MO - Northeast MO
Reporting Period: 01/01/2006 - 12/31/2006

Previous Page , Main Page

Risk Group	Number of Procedures	Number of Infections	Infection Rate (per 100 procedures)	Rate for Similar Size Hospitals (per 100 procedures)	Statewide Infection Rate (per 100 procedures)	National Infection Rate (per 100 procedures)
1	340	3	0.9	3.0	3.1	3.4
2	46	1	2.2	3.2	3.6	5.4

N/A => Too few hospitals for rate calculations.

Note: When the infection rate for a hospital is higher/lower than a comparison group rate, the difference may not be statistically significant. Return to previous page to view performance of the hospital.

Table 3: Healthcare-Associated Infection Reporting

Boone Hospital Center Profile

Facility Name: Boone Hospital Center
Region: Central MO - Northeast MO
Reporting Period: 01/01/2006 - 12/31/2006
Main Page

Central Line-Associated Bloodstream (CLAB) Infections

Intensive Care Unit (ICU)	Hospital Performance Compared with Similar Size Hospitals in Missouri	Hospital Performance Compared with All Missouri Hospitals	Hospital Performance Compared with Hospitals in U.S.	Hospital-Specific Information
MEDICAL	N/A	◒	●	Data Comments
SURGICAL	N/A	●	●	Data Comments
NEONATAL	N/A	◒	●	Data Comments

Surgical Site Infections (SSI)

Surgery Type	Hospital Performance Compared with Similar Size Hospitals in Missouri	Hospital Performance Compared with All Missouri Hospitals	Hospital Performance Compared with Hospitals in U.S.	Hospital-Specific Information
ABDOMINAL HYSTERECTOMY	◒	◒	●	Data Comments
CORONARY ARTERY BYPASS SURGERY	●	●	●	Data Comments
HIP PROSTHESIS	◒	◒	◒	Data Comments

● = Infection rate lower than other hospitals in the comparison group

◒ = Infection rate similar to other hospitals in the comparison group

○ = Infection rate higher than other hospitals in the comparison group

N/A = Too few hospitals in the comparison group for reliable rate calculation

Table 4: Central Line-Associated Bloodstream Infection Summary Data by Intensive Care Unit

January 2006-December 2006 Reporting Period

Intensive Care Unit (ICU)	Number of ICUs	Mean # of Infections per Hospital	Mean # of Central Line Days per Hospital	Statewide Infection Rate	U.S. Infection Rate [1]
Coronary	8	3.3	1646	2.0	2.8
Surgical	8	6.0	2840	2.1	2.7
Medical/Surgical	57	3.7	1565	2.4	2.2
Medical	12	5.8	2467	2.4	2.9
Neonatal	15	9.3	3069	3.0*	4.6
Pediatric (U.S. rate is for pediatric/med-surgical)	7	9.6	1830	5.2	5.3

[1] National Healthcare Safety Network (NHSN) Report, data summary for 2006, issued June 2007.

* Significantly lower than the U.S. rate.

Note: The state and national infection rates are the number of infections per 1000 central line-days. Intensive care units are in order by the statewide infection rate.

Table 5: Comparison of Statewide Central Line-Associated Bloodstream (CLAB) Infection Rates

July 2005-March 2006 vs. January 2006-December 2006

Intensive Care Unit	Statewide CLAB Infection Rates July 2005-March 2006 Reporting Period	Statewide CLAB Infection Rates January 2006-December 2006 Reporting Period
Coronary	1.8	2.0
Medical /Surgical	2.7	2.4
Medical	2.5	2.4
Surgical	2.7	2.1
Neonatal	2.9	3.0
Pediatric	5.7	5.2

Table 6: Hospitals: Surgical Site Infection Summary Data by Surgery Type

January 2006-December 2006 Reporting Period

Procedure	Number of Facilities	Mean Number of Infections per Facility	Mean Number of Surgeries per Facility	Adjusted * Statewide Infection Rate per 100 Surgeries	U.S Infection Rate per 100 Surgeries[1]
Hip Repair	57	1.8	142	1.3**	1.5
Abdominal Hysterectomy	57	2.1	143	1.5**	1.9
Coronary Artery Bypass Surgery	33	6.8	214	3.1**	3.7

[1]National Nosocomial Infections Surveillance (NNIS) System Report, data summary from January 1992 through June 2004, issued October 2004.

*Adjusted for surgery severity level using the U.S. rate as a standard.
**Significantly lower than the U.S. rate.

Note: Surgeries are in order by the adjusted state infection rate.

Table 7: Ambulatory Surgery Centers: Surgical Site Infection Summary Data by Surgery Type

January 2006-December 2006 Reporting Period

Procedure	Number of Facilities	Mean Number of Infections per Facility	Mean Number of Surgeries per Facility	Statewide Infection Rate per 100 Surgeries
Hernia Repair	20	.15	84	.18
Breast Surgery	16	.63	281	.22

Note: National data for ASCs are not available.